Amendments to the Drawings:

The attached replacement sheets of drawings include changes to Figs. 1 and 2 and replace the original sheets including Figs. 1 and 2.

In Figures 1 and 2, the figure labels have been reprinted.

In Figure 2, suitable descriptive legends have been provided for the boxes of the flowchart, as follows:

Box 10 (both occurrences): Computation of internal optimal dispatch for subsystems.

Box 11: Computation of functional characteristics for subsystems.

Box 12: Build up and solution of system of constraint equations.

Attachments following last page of this Amendment:

Replacement Sheet (2 pages)
Annotated Sheet Showing Change(s) (2 pages)

REMARKS

Claims 1-4 are present and pending in this application. Claims 1 and 3 are original. Claims 2 and 4 are currently amended.

Claims 1, 2 and 4 are rejected under 35 USC §102(e) as being anticipated by Petrie et al. U.S. 6,882,904. We respectfully traverse.

In the first instance, the general assertion that Applicant's claimed system and the cited system described by Petrie et al. '904 are identical is not well taken. In particular, the cited communication and control network for distributed power resource units of Petrie et al. '904 does not have the same features and properties as the invention of Applicants' Claims 1, 2 and 4). Instead, Applicants note that the system of Petrie et al. '904 is a centralized system, wherein the problem of optimization of the operation for the entire power system, being a subject to be controlled, is solved using one computer at a central control center [col. 14, lines 27-29]. In fact, the functioning of the Petrie et al. '904 control system is characterized by the following main features:

1) **All information about each power end-consumer and about characteristics of each power-generating unit comprised by a system is transmitted to a system control center** [col. 14, lines 30-33 and lines 37-40].

2) The central control center computer, based on this information, **solves the problem of optimization of the operation as the whole** [col. 14, lines 40-47], and in this way the computer **calculates an amount of power to be generated by each generating unit** of the system [col. 14, lines 62-68].

3) On the basis of the data obtained at a preceding point, the control center transmits **to each of the system's generating units the appropriate commands to generate a required electric power** [col. 14, lines 48-53].

In contrast, Applicants' claimed control system **<u>is a distributed hierarchic system,</u>** wherein the operation optimization problem for a power system is solved by N computers of a lower layer, and 1 computer of a higher layer.

As regards each of the above-mentioned features of Petrie at al. '904, the control system of Applicants' claimed invention differs from the Petrie et al. '904 system cited by the examiner by the following essential features:

1) In Applicants' claimed control system, the information concerning power consumers, characteristics of power plants (or concerning the power-generation requests), and also concerning topology and parameters of a power network **are transmitted in each subsystem to a lower-layer computer** that operates within a given subsystem. Thus, in Applicants' claimed control system, the initial information needed to solve the problem of optimization of the power-generation system operation is transmitted **to N lower-layer computers (where N is a number of subsystems), <u>but not to a single computer operating at the central control center</u>**, e.g. as described in Petrie et al. '904.

2) In Applicants' claimed system, the problem of optimization of the power-generation system operation **is solved by N lower-layer computers and 1 upper-layer computer**. Thus, the total number of the computers participating in solving the system operation optimization problem in the claimed system is (N + 1), while in the cited system (Petrie et al,) this number is 1.

In Applicants' claimed system, each lower-layer computer solves the problem of calculation (determination) of the optimal operation in one subsystem of the whole power system. When conducting the calculation, it is possible to determine the optimal power output of each plant in the subsystem. It is specially disclosed in Applicants' description that each subsystem includes a certain plurality of plants. Thus, the number of plants in each subsystem is more than 1.

For enabling each lower-layer computer to determine independently the optimal values of plants' power output in its subsystem, the upper-layer computer computes the optimal values of power flows between the subsystems.

3) Having solved the operation optimization problem in each subsystem, a lower-layer computer transmits the commands for generating a required electric power to each plant in its subsystem.

Thus, the two compared systems (i.e. the system of Petrie et al. '904 and the system of Applicants) basically differ in terms of their respective arrangements, and in the organization of their respective functionalities.

As to the particular objections for Claim 1, the Examiner indicates in the Office Action that the central control center 150 in the system of Petrie et al. '904 performs the same functions as the upper-layer computer (2) of the claimed system.

In fact, according to the description of Petrie et al '904, this computer 150 solves the operation optimization problem for a system as the whole, i.e. solves the problem of designing the power output of all of the power-generating units comprised by the system [col. 14, lines 34-47]. The dimensionality of this objective, i.e. the system of equations to be solved, is defined by the total number of the power-generating units of the power system.

In contrast to the functions performed by the central control center computer in the Petrie et al. '904 system, the upper-layer computer of Applicants' claimed system solves the problem of calculation (determination) of the optimal power flows between the subsystems. The dimensionality of the problem to be solved, i.e. a system of equations, is determined by the total number of boundary nodes on the power transmission lines that connect the subsystems of the power system. The dimensionality of this system of equations is many times less than that of the complete system of equations solved at the system control center of Petrie et al. '904.

For example, if a power system consists of two subsystems, each having 100 plants and connected by two power transmission lines, the task of optimization at the upper-layer computer in Applicants' claimed system is to solve a system of connection equations consisting of two equations, while in the Petrie et al. '904 system, the control center computer must solve the optimization problem consisting of 200 equations.

Thus the upper-layer computer in Applicants' claimed system performs functions that are quite different functions, and solves a problem other than the problem solved by the control center computer in the Petrie et al. '904 system.

The Examiner further states that the Petrie et al. '904 control system, similarly to Applicants' claimed system, comprises lower-layer computers in the form of controllers [col. 6,

lines 54-55], and that these controllers solve the problem of the operation optimization for a subsystem, i.e. they determine optimal values of power outputs of the plants operating in a subsystem. The Applicants cannot agree with the Examiner's assessment.

Rather, the description of Petrie et al. '904 directly teaches that the calculation of the power-generating capacities of each plant in a power-system is performed only by the control center computer [col. 14, lines 34-45]. In this system, controllers only execute the commands from the control center sent via communication channels [col. 15, lines 13-20]. Hence, the control system according to Petrie et al. '904 does not have any lower-layer computers; and the system operation optimization problem is entirely solved by single computer at the central control center 150.

The above discussion demonstrates that the Petrie et al. '904 control system cited by the Examiner does not have the features and characteristics of Claim 1 of the invention at issue. Therefore, the invention of Claim 1 meets the requirement of novelty.

As to the Examiner's particular objections to Claim 2, the Applicants cannot agree with the Examiner's contention that the computer at the central control center 150 in Petrie et al' 904 is the upper-layer computer and performs the same functions (computes driving variables...) as the upper-layer computer in Applicants' claimed control system.

Firstly, the control center computer of Petrie et al. '904 is not an upper-layer computer in the control system due to the fact that it is the single computer that solves the operation optimization problem in a power generating system. It makes no sense to define it as an upper-layer computer in a system wherein the optimization problem is solved only by one computer. (It has been shown above that the controllers comprised by the system do not participate in solving the optimization problem and they are not lower-layer computers in said system.)

Secondly, the control center computer of Petrie et al. '904 solves only the problem of designing the optimal power outputs of plants, and does not solve any other problem [col. 14, lines 34-45], while the upper-layer computer in Applicants' claimed system solves only the problem of calculation of optimal power flows between subsystems, and solves no other problem

(paragraph **[0038]** of Applicants' published application). As indicated above, in Applicants' claimed system, the dimensionality of the system of equations to be solved, i.e. a system of connection equations, is many times less than the dimensionality of a complete system of equations solved by the control center computer in the Petrie et al. '904 system.

The above discussion demonstrates that the Petrie et al. '904 control system cited by the Examiner does not have the features and characteristics of Claim 2 of Applicants' invention at issue. Therefore, the invention of Claim 2 meets the requirement of novelty.

Applicants acknowledge indication by the Examiner that Claim 3 contains patentable subject matter and would be allowed if rewritten in independent form containing all of the limitations of the base claim (claim 1) and any intervening claims (none).

Applicants submit that Claim 4 is allowable as being dependent from Claim 1 for the reasons discussed above.

Finally, it is noted that Applicants' claimed system makes it possible to provide a solution of optimal operation problems in large-scale power generation systems and to obtain the advantages for which the inventive system has been developed, just because of dissimilarities from centralized control systems to which the cited Petrie et al. '904 system belongs.

In particular, the problem of solution of an optimal operation problem of a large number of power interconnections is executed in Applicants' claimed system on the basis of the executed in-parallel solutions of optimal operation problems of all power generation systems within the interconnections. These calculations are implemented on N lower-layer computers that run in parallel. In comparison with a centralized system, where an optimal operation is designed entirely by single central computer, such arrangement allows considerable improvement in the efficiency of the whole computation process of solving the optimal operation design problem for

a large power generation entity. Among the advantages are:

1) the possibility of ensuring highly fast operation of a system for solving the operation optimization problems through parallel arrangement of the computational process;

2) a considerable reduction of total data amounts that must be transmitted within a system when these problems are solved, because all data flows are confined within subsystems; and

3) the possibility of preserving authorized powers and functions of national control centers and systems' independent operators in the power systems within the interconnections; as well as maintenance of the restrictions imposed on access to their internal data.

It should be further noted that Applicants' claimed control system is intended to manage the optimal operation of large-scale power generation systems (PGS) and power interconnections geographically extended to thousands of kilometers and having the total rated capacity of their plants as much as tens and hundreds of GWt. These interconnections may include, as their subsystems, power generation systems of independent states. It is exactly these interconnections to which Applicants' claimed system provides the most economical and technical effect. As regards the Petrie et al .'904 control system, it is intended to be used in the systems of distributed generation having the rated capacity of about tens of MWt [col. 14, lines 24-26].

Claim 4 is amended herein to correct a minor typographical error. Support is found in the published patent application, e.g., at line 3 of paragraph **[0016]**.

The drawings are amended herein, including to provide suitable descriptive legends for the flowchart. Support for the legends is found in the published application, e.g., in paragraph **[0042]**.

Applicants submit that this application is now in condition to be allowed. Early favorable action is solicited.

Please apply any charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: July 3, 2008

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